High Strength Aluminum Alloys for Cryogenic Applications

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Abstract

Super-high strength cast and wrought aluminum alloys with specific strengths exceeding that of a Ti-5Al-2.5Sn ELI alloy and tensile ductility of about 10% or higher, both at room and cryogenic temperatures, have been developed by modifying the composition and heat treatment of a 7XXX series alloy. These aluminum alloys are potential candidates to replace the more expensive titanium alloy, which is currently used in some cryogenic rocket engine applications. Microstructure and tensile properties of the aluminum alloys after casting, extrusion and forging and after different heat treatment are presented and the effects of the alloying elements and processing parameters on the properties are discussed.
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